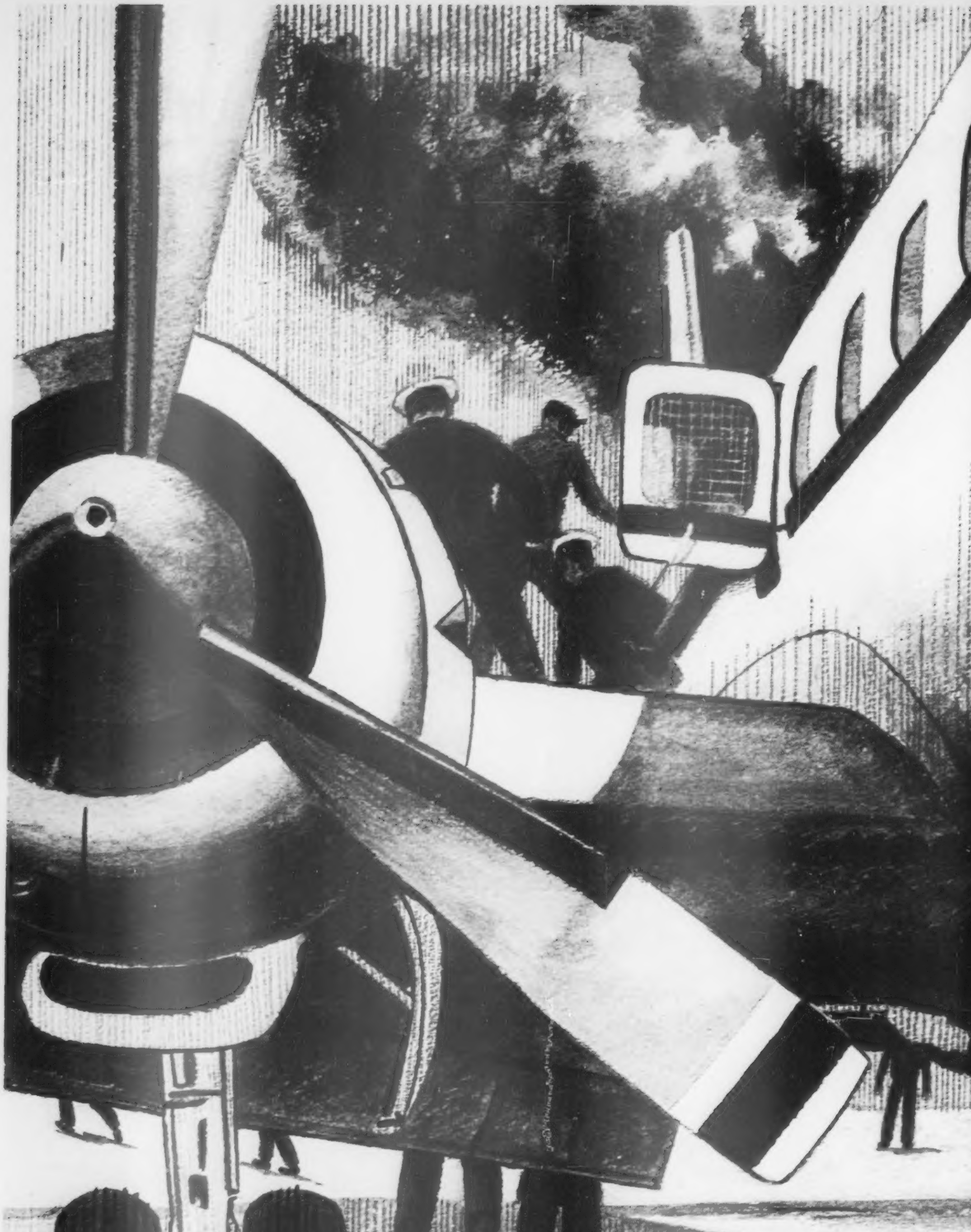
A Naval Safety Center Publication

approach

JUNE 1973 THE NAVAL AVIATION SAFETY REVIEW



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The one emergency that even the most stolid aviator will acknowledge requires the fastest, most correct action is when an inflight fire becomes . . .

A Real Scorcher

HIGH drama took place in the skies above the nation's capital in a C-118 one morning recently. LCDR Duncan E. Owen and LT John K. Barnett, the pilots; ADR2 Peter N. Shelton, flight engineer; and AMSC Lincoln G. K. Louie and AMH3 Kenneth Tool, flight attendants; composed the crew of the aircraft scheduled from NAF Andrews to NAS Alameda. There were 68 other souls onboard.

The westbound trip was the return half of a flight that originated at Alameda the day before.

On arrival at Andrews, no new maintenance discrepancies existed. LCDR Owen instructed his senior flight mech to fuel to only 3400 gallons and advised that he would recompute the following morning before departure in case he decided to increase the fuel load.

The next day was one of those typical, Washington winter days – low overcast, light rain, fog, and smoke, temperature in the low 30's, with visibility about a mile. The pilots' weather brief was completed by 0700. Forecast weather enroute included moderate to severe icing, freezing level on the deck, cloud tops at 18,000, and scattered thunderstorms along the route. Their route was to be midcontinent all the way.

LCDR Owen elected not to increase his fuel load. Since that meant he could not go nonstop, he planned a fuel stop at Richards-Gebaur (Kansas City) – just about halfway. His decision not to increase the aircraft's weight no doubt saved the lives of 73 souls onboard.

Both pilots preflighted the bird. The flight engineer had previously reported that the engine runups and all heaters had checked out OK. They taxied out at a gross weight of 101,000 pounds.

LCDR Owen advised he would take off wet, use 114 knots for V_2, and in the event of an emergency, he'd fly the aircraft. LT Barnett would handle radio transmissions, and he and Shelton together would handle any emergency. Prop feathering would be only at the TPC's command, and if an emergency dump was necessary, a dump time of 5 minutes would do the job after the aircraft was clean. Shelton was advised to turn on airfoil and cabin heaters after gear retraction, but to leave the prop deice off.

They were cleared to roll at 0851, clearance as filed, maintain 8000 feet, left turn after takeoff to 250 degrees, cross the 180 radial of Washington at 3000 feet. About halfway through their turn to 250 degrees, climbing through 1500 feet, the No. 4 engine failed. The flight engineer reported seeing a flash from his right eye, but that's all. The engine analyzer indicated a partial magneto and ignition loss problem. No. 4 engine was secured and the prop feathered. (LCDR Owen takes it from here.)

"We were at 2000 feet, and I asked LT Barnett to get me a downwind vector for an approach to Andrews. He did. I flew 180 degrees almost immediately. From the approach plate, I knew 2000 would be a good altitude for a comfortable turn onto the ILS just outside the marker."

Navy 31605: "Andrews . . . er . . . ah, Washington Approach, we'd like vectors right away. Looks like we're losing another one."

"I had no intentions of prolonging this flight on three engines, IFR. I wanted to terminate as soon as possible. Visibility was zero in heavy fog and freezing precipitation. The cloud deck was thick, and very little natural light filtered into the cockpit.

"While proceeding downwind, I thought how lucky I was to have such an outstanding copilot. LT Barnett declared our emergency, gave our fuel state, passenger count, requested a VHF backup, and asked to have the crash crew standing by. He tuned all the radios. He and Shelton were just completing the secure checklist for No. 4 when I saw a loss on the No. 2 BMEP. The pucker factor really rose at that. I was quite alarmed that I had lost No. 4 and was losing No. 2 – two engines within minutes. I had no faith whatsoever in No. 1 or No. 3 either. Positively the best place was on the runway – as soon as possible."

Washington: "Navy 605, turn left 020."

605: "Roger, 020. We'd like a VHF backup."

Washington: "Stop your turn at 090. Standby for Andrews this frequency."

Andrews: "31605 squawk 0500, ident, turn left 020, say your altitude."

Continued

605: "Down to 1.5."

Andrews: "605, heading 020, maintain 1500 feet.

Andrews: "605, squawk 0500, ident, your weather: partially obscured, 500 scattered, 1200 overcast, visibility 1 mile, light rain, fog, wind 020/10 knots, altimeter 30.10." (Two hours old. The weather was actually 300 overcast, visibility 1 mile, light rain, fog.)

Andrews: "605, new heading 030, now turn right to 050, well left of course (lost communication procedure followed), this will be an ILS approach to 01L. What engine is out, please?"

605: "We need to go direct to the runway. We've lost another. Fire!"

"I had gone to full power on No. 1 and No. 3 and was using No. 2 for whatever I could get out of it. I began a slight descent in a left turn toward the runway maintaining 180 knots and dumping fuel. We were over 2-engine operating weight. At the initial loss of power on No. 2, I high-boosted fuel thinking that might solve the problem. The engine analyzer still hadn't shown any problem. Then it began to run rough, and before we could act, a large fire developed. Flames and smoke poured out of the bottom of the engine *extending beyond the tail of the aircraft*. Fuel dump was stopped, No. 2 prop feathered, and both banks of CO_2 were discharged. The engine continued burning, and we were still 6 miles from touchdown."

Andrews: "605, cleared straight in ILS 01L. Cleared to land 01L or 01R."

605: "Give us a heading quick, would you please?"

Andrews: "030, left of course correcting."

605: "We're at 1000 feet."

Andrews: "That's fine, maintain 1000, remain this frequency, 3½ miles from touchdown, left of course, well below the glide path. Do you hear me OK? . . .

" . . . 025 heading, left of course, 2½ miles from touchdown, below glide slope . . .

" . . . 605, correcting nicely, fly 028, fly direct, up and on glide slope, 1½ miles from touchdown . . .

" . . . fly 028, now left to 025, above glide slope, coming down, on glide slope. 025 the heading, advise when field is in sight. Approaching 01L, cleared to land 01L."

"I carefully scanned airspeed, heading, and altitude, and held 180 knots – which was all I could get. When LT Barnett called 'approach lights in sight,' I had split the runway on the heading. Approach control provided heading and glide slope information throughout the approach. I had good contact with the ground at 800 feet, but no forward visibility. At 500 feet, I had good forward visibility and easily maintained safe terrain/obstacle clearance for the last mile of the approach.

"I asked for the gear over the approach lights, closed the throttles, and landed with full flaps. Once on deck, I used maximum reverse and braking. We stopped on centerline at 0904. We were surrounded by the crash crew who extinguished the fire in No. 2 engine. The outside observer said he knew we were coming before he saw the aircraft because of the glow from the fire in the fog."

Evacuation went smoothly. The flight attendants instructed everyone to exit only from the starboard side. One flight attendant led the way onto the starboard wing and down, off the flap – instructing the passengers to slide off and get away from the aircraft once on the deck. The second attendant remained in the cabin directing passengers to the forward cabin, starboard exit. He followed the last passenger out of the aircraft. The last one to leave was a midshipman with a broken leg – who voluntarily made himself last to keep from holding back his buddies. After he deplaned, a crash crewman in an asbestos suit walked forward to the cockpit. LCDR Owen asked him if everyone was out. He said, "Yes, we have the aircraft now." The TPC picked up his flight jacket and went out through the forward exit.

This was a most incredible 13-minute flight of a C-118. It was a remarkable performance by a professional crew who landed the aircraft and evacuated all hands without injuries. It represents outstanding teamwork, crew confidence in one another, knowledge of NATOPS/SOP, and flawless execution under pressure.

COMNAVSAFECEN joins CNO and COMNAR in extending a Well Done to those professionals.

Epilogue

Investigation disclosed No. 4 had failed when several exhaust stacks backed off, burning through an ignition lead causing total ignition loss. No. 2 failed because of failure of No. 9 cylinder. Ironically, that afternoon, a telephone call was received at Andrews from NARF Alameda advising to change No. 2 and No. 4 engines due to excess metal content disclosed in an oil sample.

LCDR Owen was congratulated for his handling of the emergency and for his foresight in not taking on another 6000 pounds of fuel (which would have been legal) to fly nonstop to the west coast. Perhaps the conversation he had with CAPT Woodard, CO, NAF Washington, was the most revealing. The CO remarked he didn't think they would make the field when he heard how far out they were and assumed they weighed 106 – 107,000 pounds. LCDR Owen commented they were lucky. CAPT Woodard said, "No, good pilots make their own luck."

Would you believe that two very experienced aviators could climb into their trusty S-2 and, in completely independent actions, make the same dumb mistake in setting their barometric altimeters? Believe it!

One Thousand Feet Below and Holding or . . .

Barometric Boo-Boo

By Anymouse

THE FLIGHT from NAS Socked-in to NAS Coastal Overcast was a routine logistic support mission, except for warm front weather conditions covering the entire route. Both pilots were well-rested, well-fed, and well-versed in the aircraft.

Particular care was taken in flight planning and weather briefing to ensure adherence to fuel requirements, alternate considerations, and the avoidance of enroute turbulence and icing. After a thorough preflight, engines were started exactly as prescribed by NATOPS.

Upon receiving taxi clearance, the pilots set their respective barometric altimeters and exchanged altimeter errors. The rest of the flight was conducted with the same thoroughness, and other than being IFR without a radar altimeter, the flight was uneventful – until descending to 1200 feet to set up for a GCA.

Upon emerging from the overcast on the overwater base leg and leveling at 1200 feet indicated, both pilots immediately noticed the unusually close proximity of the whitecaps and sea swells beneath the aircraft. It was quickly reasoned that either the ocean was 1000 feet too high or the aircraft was that much too low. The latter was assumed to be the case. Before climbing, however, the pilot and copilot compared their altimeters. Both read 1200 feet, and both had been reset to destination altimeter setting prior to commencing descent.

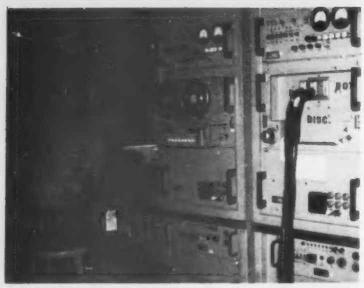
During the climb, GCA advised that the aircraft was approaching the glide slope, but was far below it. The remainder of the approach was uneventful, except that the glide slope was more like a climb slope.

Reconfirmation of the altimeter setting with ground control disclosed the sources of the problem. Yes, there were two – one sitting in the left seat and the other sitting in the right seat. Both pilots had originally set their altimeters 1 inch too high at NAS Socked-in and had carried the same error the entire flight. Apparently, both individuals had developed the bad habit of pretty much ignoring the first two digits of reported altimeter settings. Additionally, the aircraft had last flown over an area of unusually high pressure, and on this flight, the area was dominated by very low pressure.

Many years ago, back in preflight, some instructor discussed such a possibility for error and also pointed out that 1 inch of barometric pressure is approximately equal to 1000 feet. You know what? He was right!

It might be added that, besides generating inverted glide slopes, being 1000 feet off altitude while in the soup could lead to unexpected encounters with old classmates and instructors who are headed the other way in the low altitude enroute system. Sometimes it's a relief to have missed an old friend.

RECONNAISSANCE ATTACK WING



ON 12 April 1973, the Navy's only reconnaissance wing flying the supersonic RA-5C *Vigilante* completed one full year of major-accident-free operations. The wing flew over 20,000 accident-free hours and accumulated over 4,000 carrier landings.

Reconnaissance Attack Wing ONE is made up of nine fleet squadrons and one training squadron. All squadrons are homeported at NAS Albany and deploy with both the Atlantic and Pacific Fleets.

Training and operational readiness has long been the hallmark of Reconnaissance Attack Wing ONE. In recent years, the emphasis on safe operation has been increased, and the result has been a steady decline in the accident rate from 7.80 in 1966 to 0.62 for 1973. As the accident rate dropped, flight time increased, and operational readiness soared despite a decline in overall assets.

It is sometimes difficult to pinpoint why a wing/squadron is accident-free, but as seen by an outside observer, some of the reasons are: command attention by COMRECONATKWING ONE, squadron commanders, and unit officers-in-charge; sound training of both maintenance and flight crews; good communications within the reconnaissance community; unannounced operational readiness exercises that provide keen

NG ONE SETS SAFETY RECORD!

competition between squadrons; excellent civilian technical representatives and instructors; outstanding support from NAS Albany at all levels; and support from what is considered to be the very best NAMTD.

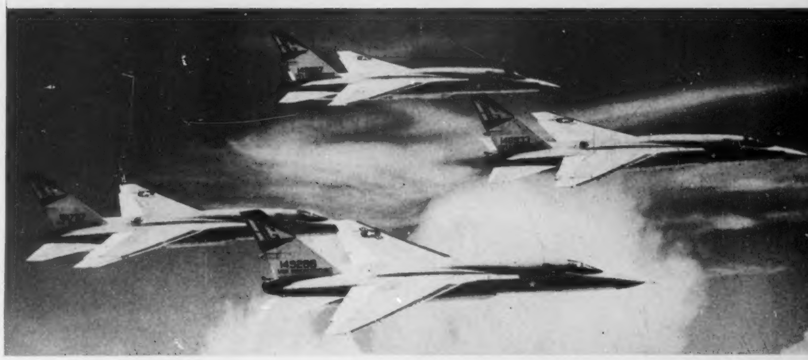
RECONATKWING ONE's accident-free year comes as no surprise to the Naval Safety Center. The meticulous manner in which the entire community devotes to incident and UR reporting is a strong indicator that safety is receiving more then just lip service.

Commander's Comment

VADM Frederick H. Michaelis, COMNAVAIRLANT, recently addressed a message to COMRECONATKWING ONE, which is quoted in part:

"With great pleasure, I congratulate each and every star performer within the *Vigilante* community on the anniversary of one full year of major-accident-free aircraft operations. The 365 consecutive major-accident-free days aehieved as of midnight, 12 April, was accomplished by great professionalism, leadership, management, and dedication to safe mission accomplishment. It is clear that the effort was joined by all hands.

"Your record stands alone in the carrier jet community and provides other similar communities with a tough act to follow."



Recent DOD cutbacks have forced the U.S. Air Force AWS (Air Weather Service) to reduce weather forecasting services at selected bases. Because so many Naval aviators utilize Air Force bases as refueling stops, each one should be aware of the new AWS satellite concept, the . . .

1. Look and read.

2. Scan and plan.

RBS
Regional Briefing Service

By MAJ Bob Gardner and CAPT Phil Budd, USAF

HAVE you noticed any changes in the services provided by your local base weather station lately? Have you taken your flight plan to meteorology and found that there was only an observer on duty? On your last flight, did you have to study the weather charts without the aid of a forecaster and then receive your DD 175-1 briefing over the telephone?

You probably have experienced one of these situations in the last few months and should expect more because of a major Defense-directed cutback in Air Weather Service people and services. Service to aircrews was directly affected by this people cut, since about a thousand were base weather station forecasters and observers. Because of the people losses, many weather detachments no longer operate full-time. Though they probably have observers round the clock, forecasters are on duty only 16 to 18 hours each day.

The Concept

To cope with this drawdown and still provide adequate support to flight crews, the troops at HQ AWS came up with the RBS (Regional Briefing Station) – satellite concept. A regional 24-hour weather station would be responsible for supporting nearby stations (satellites) during periods of closure. A standardized briefing display board would be maintained at both the satellite and the RBS station. The pilot would study the standardized briefing display to get a general outlook of the weather and then do his preflight planning. He would then call the RBS by autovon, on a phone reserved for this purpose only, and receive his 175-1 briefing.

To help us find out how the system really works – and to help us write this feature – we went down to the weather station at Scott (we are a satellite

3. Fill a few squares.

4. Make the call.

5. Listen, log, and ask.

station of Blytheville AFB from 1800 local to 0100 local) and planned a flight to the east coast. There were several things that we found out from our visit to the base weather counter after the forecaster had gone home for the night. First, we had an eerie feeling standing in front of a bare counter with the walls covered with facsimile charts and only the repetitious ratta-tat-tat of the teletype breaking the silence. Also, we wished that those meteorological symbols, teletype weather sequence codes, and hieroglyphics used to depict weather phenomenon, which we last reviewed in pilot training, were a little more familiar.

We studied the standardized display board, got our preflight winds from the upper wind chart for flight planning, filled out our Forms 70 and 175, and then called Blytheville on autovon (via special speaker phone, supplied so that the entire crew can hear the briefing) to talk to the forecaster and complete our 175-1. Although our early-evening call went right through, we found out we were just plain lucky. You can expect anywhere from 10 to 30 minutes delay because of other satellite bases calling your RBS or because of other operational demands. Remember, flight crews calling in are number six in the weatherman's list of priorities, and many bases have heavy activity until late in the evening.

To help smooth your first encounter with a similar situation, and to help familiarize you with the RBS procedures, we offer this checklist.

The Checklist

1. *Look and read.* If you are unfamiliar with the standardized pilot briefing display or if the weather station facilities are a little foreign to you, stop and look around the room. The first thing to catch your eye should be an 8 x 4-foot bordered area containing some 10 charts and a set of instructions on how to obtain RBS service. For orientation, go ahead and read the instructions, then take a look at the charts and local scheduled forecast.

2. *Scan and plan.* Now that you've an idea of what's available and where it's located, you can start obtaining enough info to flight plan without contacting the forecaster. In your data gathering, read the last teletype report for your destination and alternate weather. (Note: FLIP Planning, Section II, Meteorological Data, gives a key to teletype weather reports.) A glance at the local dissemination device will give you the latest local surface observation.

From the winds aloft panels (charts 7, 8, or 9) you can see what the last observed winds are for your proposed altitude. (Remember, those winds are *true*, not magnetic.) Areas of severe weather are plotted on chart 6; Military Weather Advisory, and hazards such as icing, turbulence, and overwater thunderstorms are portrayed on chart 4. Now go flight plan, because by this time you are weather-wise enough to select your route, destination, and alternate, and to figure ETD, ETE, and ETE to alternate.

3. *Fill a few squares.* The next thing we suggest is to get a blank Flight Weather Briefing Form, DD 175-1, and look it over so you'll be familiar with the blocks. Go ahead and fill in parts I and II, the mission and takeoff data sections. The surface observation and local forecast board will have the info for this.

Continued

4. *Make the call.* You are now ready to call the regional forecaster, so read and heed the instructions for operating the phone. It may be an external speaker-phone, with special on-off volume settings. Also, be prepared to furnish the RBS forecaster these items: (1) your name, (2) aircraft identification and type, (3) departure point, destination, and alternate, (4) VFR or IFR and proposed altitude, (5) ETD, ETE, and ETE to alternate, (6) route, (7) en route stops (in order, with ETAs).

5. *Listen, log, and ask.* From here on the procedure is like any other weather briefing; the forecaster will give you the figures for each block of the 175-1. The only thing different is that *you* will be writing in the figures instead of having the forecaster do it. You should get the same information and ask the same questions as if the forecaster were standing across the counter from you. In our case, our forecaster described the general weather conditions at departure, en route, destination, and alternate, referring constantly to the charts on the standard pilot briefing display. Don't forget you can and should ask questions throughout the briefing.

What we've described is a normal self-briefing sequence. However, there's no reason you can't call the forecaster whenever you want. Let us make it clear that if you have any questions or special requirements prior to flight planning, go ahead and call the RBS forecaster.

RBS	Satellite (reduced forecaster service)
Westover	Otis
McGuire	Dover
Langley	Shaw, Myrtle Beach
Seymour Johnson	Pope
Robins	Charleston, Maxwell
Eglin	Hurlbert, Tyndall
MacDill	Homestead
Barksdale	England
Blytheville	Little Rock, Columbus, Scott
Randolph	Bergstrom
Altus	Sheppard, Tinker, Cannon
Carswell	Ft Wolters, Gray AAF
McConnell	Richards-Gebaur, Forbes
Luke (SAGE)	Luke (BWS), Kirtiand, Holloman
Hill	Mountain Home
March	Norton, George, Nellis
Beale	McClellan, Hamilton
McChord (SAGE)	McChord (BWS)

Regional Briefing Stations and Satellites

The Charts

There is a vast amount of information available on the various charts in the pilot's briefing display. Without going into a prolonged course in meteorology, we would like to briefly explain this display. Charts 1, 2, 5, 7, 8, and 9 present actual observed data, while charts 3, 4, and 6 offer forecast conditions.

Chart 1 is the surface analysis, and it shows the general weather patterns or major weather systems. The centers of high and low pressure areas and the fronts are depicted.

From chart 2, the horizontal weather depiction, you can get the ceiling and visibility conditions. When ceilings are below 1000 feet, or visibility is below 3 miles, or both, the area is surrounded by a smooth line. Where ceilings are between 1000 and 5000 feet and visibility is 3 miles or greater, the areas are enclosed by scalloped lines.

The surface progs displayed as chart 3 show significant forecast surface weather and include depictions of ceilings, visibilities, freezing levels, fronts, and areas of precip for the next 12- and 24-hour periods.

Information on charts 4 (clouds, icing, and CAT), 7, 8, and 9 (winds aloft) was discussed earlier in the text. Chart 10 will provide the 24-hour local area forecast and any weather warnings for the local area. One display space, number 11, is reserved for an optional chart or listing and displays information needed to meet local operational requirements. Optional data include:

1. Astronomical/Climatological Tables
2. RBS/PFSV/EWAS facilities
3. Low level bombing route forecasts
4. Primary alternate forecasts
5. Range/drop-zone forecasts.

The Commercial

Well, that's the big picture of the RBS concept of operation. Because of the AWS drawdown, it's up to us to make the most from the information which is presented. Remember, it's not a total self-brief program, and we should ask the RBS forecaster or local observer for any assistance necessary. We must make sure that we get the weather service needed for a safe flight.

Since the new program puts more demands on flight crews, we all will need to brush up on symbols and charts and allow some additional time for flight planning. Or maybe we can schedule our flight planning during the hours when our local forecasters are available. The FLIP IFR Supplement gives the hours forecasting service and PFSV are available; check the individual

airfield listing. Also, in the back of the Supplement is a list of the facilities where you may obtain weather briefings if instructions on forecasting services are not available locally.

More with less is the name of the game – and weathermen and aircrews both may feel the crunch. But the well-prepared troops will still get the info they need – and won't get caught with their thermals down.

Condensed from *The Mac Flyer*

Length Shrinks

LONDON – JFK with Windsor Locks as alternate. Went into Boston for fuel. Runway 04R, wind light from N, base 800, overcast, vis 8 miles. There is a large amount cut off on this runway due to ships' masts on approach. Used all available and stopped comfortably; reverse and brakes working well. Used max reverse procedures.

Left for JFK – held for 40 minutes with conditions at Kennedy improving – 31R ILS, 1200 base, W/V N/12, vis 8 miles. The area had been affected by heavy rain and low clouds for the past 3 days.

Flew a directed ILS to 31R – again with a cutoff at the beginning of the runway. Became intrigued with the ILS and held it to about 100 feet, although in the clear, speed Vref + 12. Called for lights, but saw no reflection. Flared with small float to smooth touchdown. Pulled speed brake and came up into normal reverse – went on to brakes which immediately went antiskid. Could get very little braking without fast kickback. Went into max reverse, slowed to taxi speed with a bit in hand, but not much.

Watched a DC10 land and turn off in 3/4 length available – some people are more prudent than others!

The point I would like to make is this. I didn't cotton on to the fact that I was in trouble until the brake phase, whereas a little thought would have alerted me much sooner:

1 I knew the runway was wet – and when there was no light 'reflection' when the landing lights went on, this should have confirmed it in my mind.

2 I knew it was rubber covered at both ends.

3 Why the hell did I use the ILS so long with the possibility of a deep flare?

4 Why did I let it float? (To get a 'skimmer' of course.)

5 Why didn't I brief for more reverse as I had done at Boston; the conditions were not much different.

If you do go off the end, Chief Inspector of Accidents and his lads will ask these questions. Ask them yourself before it all begins.

Report from a Training Captain
Courtesy of *BOAC Air Safety Review*

Moral: Prevention before the fact requires thought and anticipation – in short, just plain planning. Our thanks to the candid pilot for sharing his lesson. – Ed.

System Safety

This article is the result of many months' thought concerning the manner in which we currently address the subject of safety, from the Fleet's perspective. We get pretty strong signals that the squadron viewpoint of organized safety efforts is that they are necessary evils, to be done by "somebody else" whenever possible. Squadrons have become accustomed to having safety requirements handed to them, leading to an insidious antisafety (although not *un*safe) attitude.

This article attempts to bring the squadrons back into the safety mainstream by short-circuiting the bureaucratic procedures of directives and form reports. Rather than bombard a CO with safety platitudes, it provides a useful tool with which he can actively participate in "safety" to his own direct and immediate advantage. Hopefully, this will encourage a greater awareness and enthusiasm for safety management in operating units.

A WELL-KNOWN northeastern brewery attributes the quality of its product to the systematized attention of three integrated elements. Those of you familiar with the "three ring" sign probably recall those elements as "purity, body, and flavor." Whether or not you agree with the brewer's pronouncement of superior beer, you have to admire his clear description of how these elements combine to make the desired product. Actually, our friendly brewer is somewhat less inventive than we may first judge. It appears that he capably adopted the diagrammatic logic of John Venn, an English logician, published around 1900.

The process of brewing has been around a lot longer than the process of system safety, but we latecomers have also come to rely heavily upon the increasingly popular Venn diagram to communicate an important message about our "product."

Systematized Safety

On 15 July 1969, Military Standard 882, published by DOD, became effective. It addresses the requirements for a "System Safety Program for Systems and Associated Subsystems and Equipment." Bearing in mind that MIL-STD-882 was written for the primary purpose of forming procurement contract requirements, we can define "system safety," *as it applies to hardware*, from paragraph 3.3 as: ". . . the optimum degree of safety within the constraints of operational effectiveness, time and cost, attained through specific application of system safety management and engineering principles throughout all phases of a system's life cycle." What this well-constructed mouthful really says is:

a) No activity can be absolutely free from hazard. Recognizing this fact, we are motivated to take all possible actions to eliminate as many sources of hazard as we can and to provide protection against those hazards we can't eliminate. But there are very real limits to our abilities to reduce many hazards, i.e., four engines hung on an A-7 would certainly reduce exposure to the hazard of complete power failure and doubling the internal fuel capacity of an F-4 would similarly reduce exposure to the hazard of fuel starvation. These facetious examples illustrate the conspicuous constraints of operational effectiveness and cost. Less conspicuous is the time factor, in terms of airspeed to target or delay for engineering design and production. We must balance

the feasibility of hazard reduction against the likelihood of critical danger and the resources necessary to reduce that hazard *to an acceptable level*.

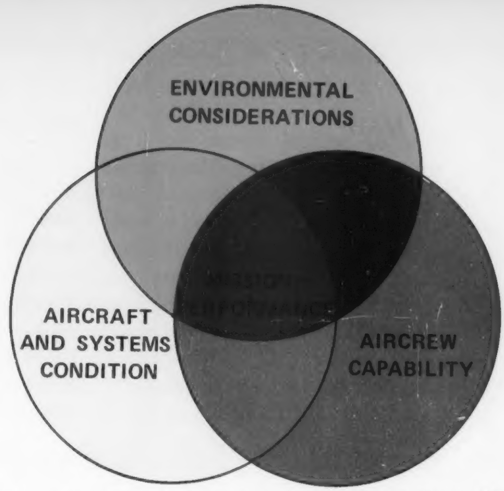
b) To attain this optimum degree of safety, it is really *not* necessary to deliver a new aircraft to the Fleet, count the accidents, then go back and correct the identified hazardous discrepancies. We have become smart enough to conceptualize the use of an aircraft (or any other weapon system) over its lifetime as an interacting "system," from birth to death, through the phases of design concept, contract, development, production, fleet operation, and ultimate disposal. System safety requires the prediction and control of hazards in each subsequent phase of the aircraft life cycle. This begins with a formal Preliminary Hazard Analysis and continues through several techniques for hazard identification and control. Through the concept of system safety, we are better able to evaluate and control hazards present in the *totality* of a weapon system.

So what! Very few of us are in the business of procuring new aircraft, so what's in "system safety" for the rest of us? Plenty!

System Safety For Squadrons

System safety isn't a *thing*; it's a concept. As such, it is flexible enough to be applied to anything we can define as a *system*. Next time you hear a nugget criticize the "system," ask him to define his terms. He might just cite some restrictive regulations or squadron SOP which require minimum experience standards prior to designation as a flight leader or aircraft commander . . . By Jove, he's got it!

We can broadly define the squadron's performance of its assigned mission as a system. A slight modification to our Venn diagram makes it look like this:



You will notice that some pretty important things like command leadership, training, parts availability, and basic aircraft capability are apparently not considered in this simple logic diagram. They are in fact *determinants* of the summarized inputs to the mission performance. If you're fresh out of crossword puzzles and handy with a compass or bow pencil, you might take each summarized input and try to develop a Venn diagram of the subordinate inputs to each desired result. As we step down from the abstract to the specific, the increasing quantity of inputs influences us toward *listing* these factors, lest we be accused of being circle freaks.

So far, this display of diagrammatic skill hasn't really taught us anything new. It's just organized "common sense." (Like wearing a hardhat – but look how long it took us to learn that!) To reinforce the common sense approach, and perhaps pat ourselves on the back, let's look again at those elements in the Venn diagram and some of the factors which influence them. Continued

and the Decision Maker

By LCDR R. A. Hess

MAN	ENVIRONMENT	MACHINE
training	weather	known faults
qualifications	terrain	system degradation
capability	navaids	fuel load
experience	terminal facilities	change compliance
	mission	
attitude	sea state	configuration
health	light	weapons load
anxiety	temperature	quality assurance
fatigue	traffic	quality of maintenance
etc.	etc.	etc.

We've long had established standards for control of each of the three elements of the diagram. Witness our flight training, pilot qualification syllabi, and NATOPS checks; severe weather warnings, approach minimums, and VFR criteria; aircraft system redundancy, reliability, and fuel containment. So we're far from being in the Dark Ages in our efforts to systematize safety in our squadron operations. In fact, the records show amazing improvements over the past decade. But like the Redskins at the 10 yard line, it's now that the going gets tough!

The Problem

LT Rick Stick is the squadron Stan Officer. Selected for the job based upon his professional competence, he has verified his assignment by sugarcoating the NATOPS pill with wit and enthusiasm. He's an expert, respected by all and liked by most. He quietly sparkles in a crowd, and takes great pride in being able to do the toughest jobs handed him. You know him! He's on the early evening flight schedule tonight for a routine low-level flight. The deck is wet and the goo is grey, but a check with Ops says we'll be out of it soon, so launch as scheduled. Maintenance control provides a go bird. After some words of sympathy for having to miss the John Wayne flick, we leave Rick in the readyroom (secretly thanking Schedules that it's better Rick than either of us).

John Wayne is just about to approach his nemesis when we hear the squadron skipper, Ops, and ASO all being paged. Five minutes later, a foreboding shuffling near the doors draws our attention. Rick Stick is gone. Lost radar contact, no radio transmissions. A sudden confusion engulfs us. It's not possible! Rick is too capable to let events overwhelm him! Time passes, and we accept the reality of the loss.

The accident board's investigation reveals a letter of resignation Rick had been working on, citing a chronic health problem of his wife as the primary motivation. We all knew his wife had been in and out of the hospital, but she appeared to be pretty well; and knowing how Rick loved his Navy life, we figured he'd been able to work things out. Rick's roommate tells the board that Rick had been increasingly unhappy over the past few weeks, and offers a rumpled letter from Rick's desk. Rick's wife is back in the hospital, but mother is with the children. Too bad the older boy gives her such a hard time . . .

We both know the strain of groping in the low, grey stuff and can't help but wonder what Rick was thinking about and what happened to him. Did something catastrophic happen to his aircraft? Did a series of minor malfunctions gang up on him? Was his mental distraction so severe that he just flew into the water? Was there any way this loss could have been prevented? Could we have done something differently?

A Possible Solution

It would be foolish to propose that there is a way to absolutely prevent an accident of this type. It is equally unrealistic to proclaim that there is nothing we can do about it. The "system safety" approach is a disciplined examination of the elements which combine to form an event – in our case, the aircrew, the flying environment, and the aircraft. When system safety is applied to hardware, it involves quite a bit of number pushing. In oversimplified terms, the probability of hazard in each individual element is appraised; then to recognize the interaction of these elements, a joint probability of hazard (risk) is calculated. This risk assessment is compared to what has previously been determined to be an acceptable risk, e.g. 99.87 percent probability of safe

mission completion. Any combination of elements which causes a risk calculation of less than 99.87 percent is therefore unacceptable, and alternative actions are explored.

We believe that we can get a big payoff from the concept of system safety just by exercising the discipline and *approximating* the hazard probabilities rather than analyzing them statistically. There are very few business managers willing to risk millions of dollars without a fairly vigorous study of their probabilities of success. Considering our risk of lives as well as investment, can we afford to do less?

A *formal* system safety evaluation would require a detailed analysis of each of the three elements (aircrew, environment, and aircraft), both independently and in combination, prior to every single launch. All of the factors relevant to the hazard potential of the aircrew would first be identified, then weighed for degree of importance, then evaluated and accumulated to arrive at a *term which would express our confidence in the aircrew's capability to safely complete its task with a normal aircraft in a normal environment.* The environment and aircraft elements would be similarly analyzed and expressed in single terms of confidence (or probability). These three terms would then be combined to arrive at a "joint probability of occurrence," which effectively integrates our individual evaluations into one quantified estimate for the safe return of one specific sortie. This quantified estimate would then be compared with a previously determined maximum criterion of acceptable risk. A sortie risk estimate not meeting this criterion would send us back to the drawing board to test the fit of a different element (e.g., aircrew) in the combination. If our element juggling did not vary the sortie risk estimate sufficiently to meet the criterion, the CO would be obliged to review the need for this particular sortie in light of the calculated unacceptable risk it requires. Of course, all of this should take place immediately prior to launch to ensure valid consideration of the specific elements.

A formal system safety evaluation such as this could provide several benefits. First, and perhaps most important, it would require a regimented review of the combination of risks involved in *each sortie*. Secondly, it would provide quantified justification for a CO's decision to reschedule or possibly cancel a sortie. Third, it should decrease the loss of assets due to mishaps and thereby increase our operational readiness.

A brief review of the time and effort necessary to perform a *formal* system safety evaluation leads to the immediate conclusion that this is not for us. There's no way the normally hectic preflight period can allow for the luxury of a detailed analysis and numberpushing exercise to verify a flight schedule. What's more, the CO, operations officer, and schedules officer frequently perform a common-sense analysis of pilots and mission assignments as it is. So what's left? *Can* system safety be applied to the daily flight schedule? Can we realize any of the benefits without paying the full price?

Yes. The system safety concept is an executive tool

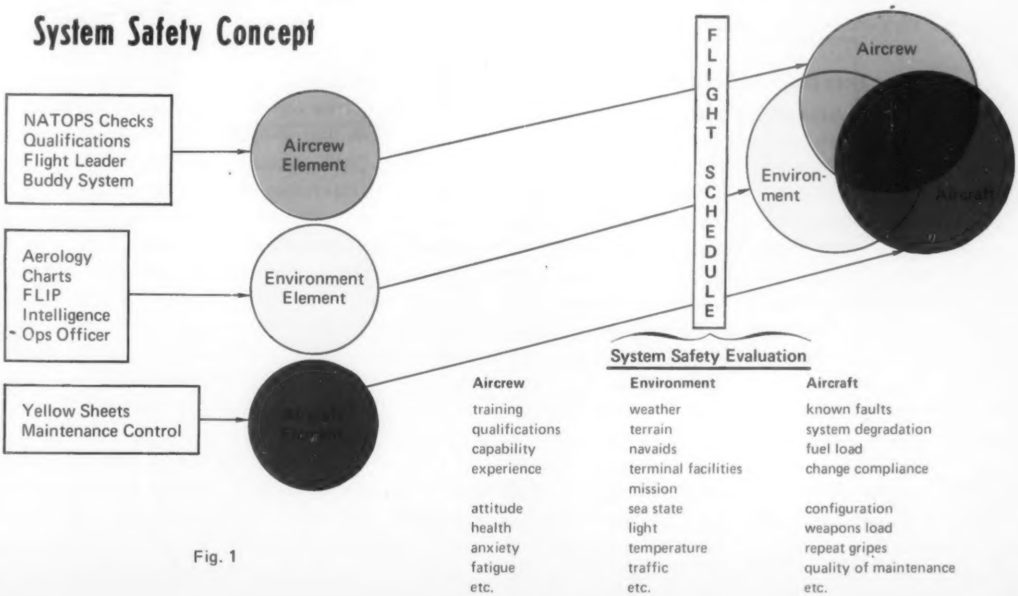


Fig. 1

for methodical management of risk. By using the logical format and procedure of the concept and disregarding any need for precision, it is possible to get a significant benefit with the minimum expenditure of energy (e.g., the division of $215.00 into three equal parts is obviously *about* $70.00 each. Minimum effort provides 97+ percent accuracy. The additional effort to get a precise answer may hardly be worthwhile.).

The pragmatic application of system safety to an operational situation then becomes relatively simple. It is a matter of consciously performing a subjective analysis of each of the three elements as they appear in combination, *consistently*. A mental checklist such as that proposed in our earlier discussion of the Venn diagram may prove to be sufficient. The most important factor is not *how* these elements are evaluated, but rather that they *are* evaluated prior to the launch of each sortie.

Data Input Difficulties

Fortunately, we have fairly reliable standard methods to help us in our evaluation of the environment and aircraft elements. We know that the status of these elements changes quite rapidly through the day and that there are formal systems for keeping up with these changes as they occur. The element defined as aircrew, however, is perhaps the most critical and yet the least controlled and documented. Although a permanent pilot qualification jacket to assist in evaluating individual capabilities is in development, this useful package is not likely to be generally available for many months. Our existing formal standards for aircrew are insufficient and tend to place people on plateaus: those who are qualified and those who are not, implying that all qualified people are of equal capability and can deal equally well with any challenge which may occur. We further implicitly assume that this level of capability is constant, that it does not change over the course of a day or even day-to-day. But because we all know better, we apply informal methods to **acknowledge** the differences in capability among the "qualified" and to recognize that the capability level of any specific individual will vary with training, fatigue, or anxiety.

Although the CO and Ops officer inevitably have mental ratings on each aircrew member, postaccident investigations suggest that these ratings are often not current or sometimes not applied at all. In our case of Rick Stick, Schedules may have acknowledged Rick's general level of capability, but had no means of recognizing a recent subtle decrease of his ability. Perhaps, if Rick's roommate had been asked to evaluate Rick's emotional readiness, something *could* have been done differently. A more reliable evaluation of the aircrew element is essential to the application of system safety. The variety of options for this evaluation may include a buddy system, routine CO/Ops interviews with aircrews, self-reporting, or making the flight surgeon "one of the boys." In any case, this evaluation of individual aircrew capability must be routinely provided.

We might also propose that there are differences between "up" aircraft. Although this is never formalized, maintenance control and most of the pilots know by heart the side numbers of the aircraft which seldom fail and those dogs that seem plagued by problems. But these distinctions are never visible on the aircraft status report. If possible, it would be desirable that maintenance control supplement the "up" status with an indication of the expected reliability of each aircraft. For example, Old Reliable may get a "3" notation, most of the other good aircraft a "2," and one just coming out of check a "1" or "0." (See Fig. 2.)

The current status of the mission environment should be most readily available from the information put together by the briefing officer. With a little encouragement, he should be able to make a simple, single factor evaluation of the environment (day CAVU "4," night IFR "1").

Putting It All Together

With a routine flow of input data, the overall system safety evaluation of a sortie can be accomplished in a matter of seconds. A format, such as proposed in Fig. 2, may be reproduced or put under clear plastic. The sortie evaluation would be available just about as quickly as the Ops officer can make three grease pencil marks and add three digits. In almost all cases, this simple formalized evaluation should surprise no one, but rather reinforce the normal common sense decisions which are our way of life. Its major value is that it encourages a disciplined method to identify and measure risk exposure in terms that can be easily communicated and understood – and less likely to be disregarded when things get hectic. Perhaps once a month, this method may highlight an undesirable or unacceptable combination of elements which would otherwise have been *our* accident waiting to happen. Maybe we *can* do things differently – and better.

Summary

The routine management of daily flight operations is undoubtedly "where the action is." Missions can be accomplished or lives and aircraft lost through the influence of this one activity. The aids available to us so far have been limited: basic pilot qualifications, minimum weather criteria, and ready aircraft. We have had little but gut feel and the common sense approach (sporadically applied) to help us recognize and adjust for the event when three marginal elements combine for a very shaky sortie. Too often do we realize this undesirable combination of elements only when it's too late – as we anxiously await the return of a flight.

The concept of system safety can provide us with a pragmatic, analytical assist to manage the routine risk to which we expose our investments. By borrowing from the businessman's decision logic and joint probability theory, we can help standardize and justify each multimillion dollar decision we make – every time we launch an aircraft.

Comments on this article and discussion concerning actual experience with such a decision-aid procedure are encouraged. Address responses to: Commander, Naval Safety Center, Code 121, NAS Norfolk, Va. 23511.

Sortie System Safety Evaluation

	OUT-STANDING	GOOD	FAIR	MARGINAL
AIRCREW ELEMENT	5	4	3	2
ENVIRONMENT ELEMENT	4	3	2	1
AIRCRAFT ELEMENT	3	2	1	0

TOTAL FOR THIS SORTIE: ______

Acceptable: 8 – 12
Undesirable: 6 – 7 [Requires CO evaluation and decision]
Unacceptable: 3 – 5 [Requires revision of elements]

Example: a) "Rick Stick" prior to personal evaluation:

5 + 1 + 2 = 8

b) After consideration of personal anxiety:

3 + 1 + 2 = 6

(may be reproduced for local use)

Fig. 2

Commanding Officer, CAPT F.D. Goetschius, kicked off the day's events by addressing the men at morning quarters.

Is your squadron planning a mid-year safety standdown? If ... pay you to read of VR-21's experience in planning and e... outstanding . . .

Safety Sta...

SINCE Fleet Tactical Support Squadron TWENTY ONE's present designation in 1957, over 327,000 hours have been flown without a major aircraft accident. This enviable record was not achieved by chance. Transport operations require extraordinary dedication and vigilance to ensure the safe and expeditious delivery of cargo and passengers to widely scattered areas under constantly varying flight conditions.

Thus, as the date approached for the annual safety standdown, an interesting question presented itself to the safety office: how to conduct a safety standdown, for a squadron already safety conscious, so that it would still be meaningful and significant?

One month prior to the standdown, it was decided that a fresh approach would be to emphasize "doing" as opposed to lecturing. Where possible, new faces would be called in to present programs; the feeling being that outside sources would provide a new point of view for the crew. Above all, group, as well as individual, participation would be utilized to the maximum extent.

Working with the Enlisted Safety Council and the Aviation Safety and Human Factors Committee, areas of weakness were discussed. Additional meetings with NATOPS, aircrew training, and maintenance exposed other potential problem areas and resulted in scheduling exercises designed to eliminate known deficiencies. NATOPS quizzes were provided for C-118 and C-130 aircrews. Guest lecturers were utilized, and several new and enlightening films were reviewed.

"Safety Standdown '73" was officially kicked off during morning quarters by the Commanding Officer of VR-21, CAPT F. D. Goetschius. His opening remarks to the assembled squadron set the tone for the day's activities: "In fiscal year 1973, the Navy established as a goal .73 accidents for 10,000 hours of flight time, but VR-21 has a goal of zero accidents. Our goal applies to ground (industrial, recreational, traffic) accidents as well as flight accidents. We can only hope to accomplish this

The medical department presented a program on first aid for the line division.

LT Mason (left), assistant aircrew division officer, plans out the day's events posted on the safety bulletin board.

Mr. Miller from the FAA demonstrates how vertigo can lead to disaster in his spinning chair.

The base fire department presented a demonstration on proper firefighting techniques with various extinguishers.

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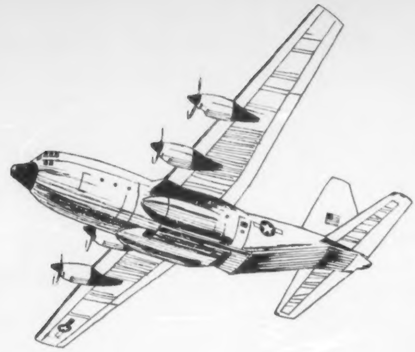
annin and executing an

tanddown

By LT K. Santoro and LTJG E. Mahnerd



when everyone actively participates in safety programs."

After morning quarters, the squadron formed into separate divisions to begin the day's activities. In the aircrew division, dry ditching drills were conducted, and emergency procedures practiced. With the large number of engine turnups performed by aircrews, it was decided that a check of emergency communication procedures would be beneficial. An unannounced airplane fire drill was conducted with the assistance of the line division and the air station crash crew.

Maintenance personnel were given refresher instruction on their more difficult and intricate maintenance procedures in actual job situations.

Pilots and navigators also performed dry ditching drills and conducted thorough preflight inspections of their respective aircraft. Later in the day, the officers attended a lecture by Mr. C. J. Miller, of the Federal Aviation Administration, who talked on approach/landing techniques and vertigo. Everyone had a chance to ride in the "vertigo trainer" – with the result that showed . . . "Yes it *can* happen to me."

Squadron administrators were included in the program. The YNs, PNs, and strikers were refreshed on fire prevention, electrical hazards, and first aid. Thorough safety inspections were conducted throughout the hangar, and potential safety hazards/violations were eliminated.

All personnel were administered applicable NATOPS exams and completed an opinion survey expressing their ideas on how to improve safety techniques within the squadron.

On final analysis, because of effective advance planning, it was a very successful day. Tangible results were achieved, with a large number of constructive ideas being received from all branches within the squadron. The safety standdown program has once again proved to be a useful and viable means of reinforcing the squadron's safety consciousness. ◄

Ditching drills were practiced by aircrew personnel.

Aircrew and line divisions working in conjunction with the crash crew, conducted an aircraft fire drill.

Aircrew personnel check the schedule of events posted on the squadron's safety bulletin board.

Because of the momentum and urgency of the AIMS program, many aircraft are being retrofitted before aircraft NATOPS manuals are updated to include information about the equipment. This article seeks to fill that gap by providing pilots with basic information about the equipment.

AIMS*

Self Test/Monitor

By LCDR John L. Lightstone
NAVAIRSYSCOM

* Air Traffic Control Radar Beacon System (ATCRBS)
Identification Friend or Foe (IFF)
Mark XII
System

THE AIMS retrofit program is in high gear. A majority of Navy aircraft now have AIMS (or AIMS provisions[1]) installed, and many more aircraft installations are being completed every month.

The AIMS transponder system provides a 4096 code capability on mode 3 (civil mode A), automatic altitude reporting on mode C (see "Automatic Altitude Reporting," APPROACH, July 1972), and secure military mode 4.[2] In addition, the AIMS system includes self-test and monitor functions to test the transponder before (or during) flight and to monitor the system during flight.

A typical AIMS aircraft installation includes a transponder, control box, transponder test set, crypto computer,[2] and altimetry. In some aircraft, the altimetry consists of one or two AAU-19/A altimeters and an altitude computer or a CADC (central air data computer). In other aircraft, the altimetry consists of an AAU-21/A and an AAU-24/A altimeter.

The self-test and monitor functions for the transponder are provided by the TS-1843 APX Transponder Test Set, a small box installed between the transponder and the antenna.[3] The controls for the TS-1843 are included on the C-6280A(P)/APX control box. Additional monitor functions are built into the altimeters.

[1] In some aircraft, the initial AIMS installation includes "provisions only" for some components of the system. Until the components are installed at a later date, these aircraft will have reduced AIMS capabilities.

[2] The secure military mode 4 (Mark XII) is included only in operational aircraft.

[3] The self-test and monitor functions are built into the KY-532A and KY-533A AIMS transponders.

Fig. 1 AAU-19/A

The AAU-19/A servoed altimeter (Fig. 1) is used in higher performance aircraft in conjunction with an altitude computer (CPU-46/A or CPU-66/A) or a CADC. The altimeter has a counter-drum-pointer display. The single, large pointer indicates hundreds of feet, while thousands of feet are indicated by the two large digits on the counter-drum. Below 10,000 feet, the first digit is replaced by a diagonal warning symbol. The small digit on the counter-drum is a repeat of the hundreds of feet.

There are two modes of operation, RESET (servoed) and STBY (standby), controlled by the momentary contact function switch at the lower right corner of the altimeter. In the servoed mode of operation, the

altimeter is controlled by corrected pressure altitude signals from the altitude computer or CADC. The altitude computer also encodes the altitude signals and feeds them to the transponder for transmission on mode C. The transmitted signals are based on a barometric pressure of 29.92 inches of mercury and are not affected by the barometric knob on the altimeter. The correction for local pressure is applied at the ground station.

If the altimeter loses the signal from the computer, it automatically switches to the standby mode, and a STBY flag appears. The standby mode can also be selected with the function switch. In the standby mode, the altitude computer is bypassed, and the AAU-19A operates as a barometric altimeter (uncorrected). Note that the transponder may continue to transmit corrected altitude from the altitude computer on mode C while the altimeter is operating in the standby mode (uncorrected).

Also in the standby mode, a vibrator is operated by d.c. power to help overcome friction in the counter-drum-pointer mechanism. If d.c. power is lost or the vibrator fails, the 100-foot pointer may hang up momentarily near the 12 o'clock position as the 1000-foot digit is changing during climbs and descents.

The AAU-21/A encoder altimeter (Fig. 2) is a barometric altimeter with an encoder to provide altitude signals to the transponder. The AAU-21/A, which also has the counter-drum-pointer display, is used in aircraft which do not require an altitude computer or CADC. If a.c. power to the encoder is lost, the AAU-21/A will continue to operate as a barometric altimeter, but a CODE OFF flag will indicate that no altitude signals are being provided to the transponder. As with the AAU-19/A, if the d.c. powered vibrator fails, the 100-foot pointer may hang up momentarily near the 12 o'clock position.

The AAU-24/A is a barometric altimeter only (no encoder) with a counter-drum-pointer display to match the AAU-21/A. The AAU-24/A also has a d.c. powered vibrator to help overcome friction.

The standard control box for AIMS transponders is the C-6280A(P)/APX (Fig. 3). The MASTER switch in the upper right corner controls all modes of operation. The MASTER switch must be lifted over a detent to switch to OFF or EMERG. The mode 4 controls and the mode 4 REPLY light are on the left side of the control box. The remaining controls and the TEST light are associated with modes 1, 2, 3/A, and C. The four switches in the center are the mode 1, 2, 3/A, and C select and test switches. Each switch has an OUT, ON, and spring-loaded TEST position. Individual modes are tested by pressing the appropriate switch to the TEST position. When the switch is pressed, the TS-1843 interrogates the transponder on that mode and checks several parameters including transponder receiver sensitivity and frequency, reply frequency, power output, and antenna voltage standing wave ratio. *A GO is indicated by illumination of the green TEST light. A NO-GO condition is indicated if the light does not illuminate.*

The RAD TEST-OUT-MON switch on the right side of the control box is used for monitoring modes 1, 2, 3/A, and C. The RADiated TEST position is used for ground maintenance only. When the MONitor position is selected, the TS-1843 will flash the TEST light as the transponder responds to mode 1, 2, 3/A, and C

Fig. 2 AAU-21/A

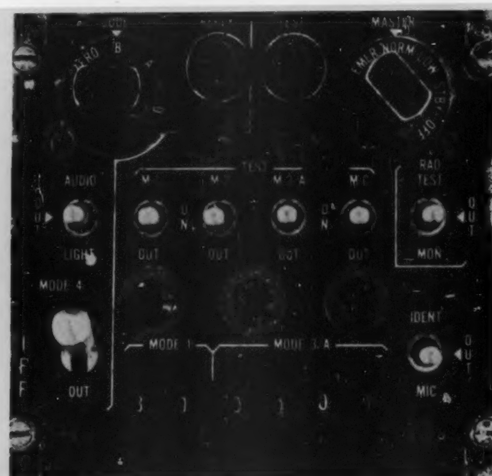


Fig. 3 C-6280

interrogations. If the TEST light does not frequently flash while operating in an ATCRBS environment (with MON selected), it is an indication that the transponder is not replying or that the response is out of tolerance (frequency, power output, etc.).

The AUDIO-OUT-LIGHT switch and the mode 4 REPLY light are used to monitor mode 4. When AUDIO is selected, a buzz will be heard as mode 4 interrogations are received,[4] and the REPLY light will flash as the transponder replies on mode 4. The LIGHT position selects the REPLY light only for mode 4 monitoring.

In addition, some aircraft have an IFF CAUTION LIGHT installed on or near the instrument panel for mode 4 monitoring. The IFF CAUTION LIGHT is independent of the AUDIO-OUT-LIGHT switch and will illuminate if the crypto computer has failed or if the transponder is not replying to mode 4 interrogations.

The AIMS system was designed to provide increased operating efficiency and safety in both ATCRBS and operational environments. To ensure that the AIMS system is operating properly, use the self-test and monitor functions and know the meanings of the malfunction indications. ◄

[4] The audio tone is not connected in some aircraft.

The First Time Around

By LCDR Sterley B. Van Pelt
Naval Safety Center

IN 1943, when Navy men were fighting World War II, another occurrence was quietly taking place that would affect the Navy for years to come. That year, the Navy purchased its first helicopters (Sikorsky H-4s) from the U.S. Army. The original planned use was to combat enemy submarines. But it was slow going in those days because there were a lot of dyed-in-the-wool, fixed-wing drivers that felt fixed-wings were the ultimate. Nevertheless, helo development continued.

Early helo development proceeded more along the utility and rescue lines than ASW, but the helo eventually proved itself as an ASW weapon system. These early days provided some interesting mishap data. For instance, the first recorded mishap occurred in October 1943 when an N2S-2 jumped the chocks and taxied into an HE-1. (Perhaps the fixed-wingers were trying to nip this helo thing in the bud?)

Lessons learned began to mount steadily. Perhaps you'll recognize a few that have since been relearned, *time and time again.*

1. April 1944 – Helo and fixed-wing collided on taxiway – pilot error (HE-1).
2. 31 May 1944 – Aircraft crashed during a confined area landing in an attempt to provide medical assistance – pilot error (HE-1).
3. 12 August 1944 – Aircraft engine failed followed by an autorotation and crash into a swamp – fuel contamination (HE-1).
4. 11 April 1946 – Poor auto recovery – struck tail boom – pilot error (HOS-1).
5. 31 May 1946 – Overloaded aircraft – no wind – damaged tail boom during unsuccessful takeoff attempt – pilot error (HOS-1).
6. 18 December 1946 – Aircraft began spinning – autorotated and crashed – material failure of a tail rotor blade (HOS-1).
7. 19 January 1947 – Aircraft crashed during landing approach – ice accumulation – pilot error (HO3S-1).
8. 23 June 1948 – Aircraft struck an osprey with its rotor blades – minor damage (HO3S-1).
9. 20 July 1948 – Wood/canvas target suspended on hoist flew up and struck rotors – minor damage (HO3S-1).
10. 29 December 1948 – High-speed rotor stall – extensive damage to dynamic components.

These are only a sampling of the early mishaps. One can't help but wonder how helo history might have been rewritten if we had just learned these lessons the first time around.

Burning Issue

SUNBURN is not the most serious subject in the world – unless, of course, you are the sunburnee. Then very little else takes precedence.

For pilots and aircrews, a most important problem resulting from the amount of exposure necessary for a sunburn is the consequent reduction in night vision. Lying on a white beach in bright sunlight without your sunglasses can significantly reduce your ability to dark-adapt for as long as 36 hours. If you are on the schedule for night duty, protect your eyes from bright sunshine during the day. Wear your sunglasses – not only on the beach and beside the pool, but on the flight line.

Dermatologists tell us that the cumulative effects of sunburn are aging skin and skin cancer. The American Cancer Society says approximately 120,000 *new* cases of skin cancer are reported in the United States each year. Yet, says ACS, this form of cancer is largely preventable through avoidance of overexposure to the sun.

The most common precancerous skin condition is actinic or sun-ray keratosis. A keratosis is a small skin-thickening that usually develops on an exposed part of the body such as the face, neck, forearms, and backs of the hands.

Ultraviolet radiation in sunlight is the principal cause of skin cancer. Major irreversible skin damage is produced by chronic exposure to ultraviolet light and accumulated chemical changes in the skin over the years.

The kind of skin you have and your occupation are factors in sun-caused skin damage. Dark-skinned people have more built-in protection against the ultraviolet rays of the sun than do light-skinned people. And ACS says that, for example, farmers and sailors are highly susceptible to skin cancer. So are other outdoor workers in such sunny regions as the southern United States.

Particularly, if you are fair or have a ruddy complexion and are exposed excessively to sunlight, you should see about getting a *sunscreen* (not just a suntan) ointment or lotion to *screen out* the sun's harmful ultraviolet rays. Wear a long-sleeved shirt and a hat when you are out in the sun for long periods. And when you go swimming, remember to put on another coat of ointment or lotion when you come out of the water. (This applies to suntan ointment and lotion, too.)

Incidentally, engine oil or lubricating oil should *never* be used as a suntan lotion. Toxic ingredients in such oils can be absorbed through the skin.

Fair-skinned people can get a bad sunburn sitting under an umbrella, and anyone can get sunburned legs wading in the water if he stays out long enough. Ultraviolet light bouncing off the beach or patio (or even off shiny metal surfaces like aircraft) or penetrating water causes the burn.

Here's another problem which has developed in modern times:

If you are taking photosensitizing drugs (although it is not likely you will be if you're on flight skins), you may have trouble. These drugs are: certain tranquilizers, drugs for high blood pressure and antibiotics, and all drugs containing sulfa. In some individuals, such drugs alter the skin's normal protective response to sunlight and cause it to burn more easily or even break out at the slightest exposure to sunlight. Your medical department can specifically identify these drugs for you.

If you want to acquire a painless suntan, ideally you should do it gradually. Ten or 15 minutes on a side is enough for the first day. If you sun longer, do it before 1000 or after 1400. The sun is strongest during the 4-hour period in between. Increase your daily dose by about 5 minutes each day. And don't forget, you *can* burn under a hazy sky or even on a cloudy day.

In summary, a bad sunburn can:

- Affect your overall efficiency.
- Diminish your night vision.
- Add to your cumulative risk of skin cancer.
- Have a marked effect in prematurely aging your skin.

Take it easy – that's the word.

Severe Weather Avoidance

By John E. Berta, FAA Liaison
Naval Safety Center

WITH the coming of the summer season, this might be a good time to brush up on what we all know *(or should know – Ed.)* about severe weather and how to avoid or minimize the results of an encounter. We all recognize the need for sound judgment when dealing with thunderstorms or when flying through areas for which severe weather (such as severe turbulence or hail) may have been forecast. *(Let OPNAVINST 3710.7F, paragraph 325c, be your guide. – Ed.)* To increase this understanding, it would pay to better know the role ATC plays in giving the pilot a helping hand.

Present ATC procedures provide for controllers to assist pilots in avoiding areas of known severe weather, particularly when operating on IFR flight plans. It must be realized, however, that at times there are limitations to an air traffic controller's capability for providing such assistance. There are several reasons for this. First, the controller's primary responsibility is the safe separation of aircraft. No additional services can be provided which will derogate the performance of this responsibility. Secondly, limitations of ATC radar equipment, communications congestion, and other air traffic may also reduce his capability to provide any additional services.

To a large degree, the help given by ATC will depend upon the weather information available to controllers and the requests made by pilots attempting to avoid severe weather areas. Because of the extremely transitory nature of thunderstorms, information available to controllers might be of only limited value unless frequently updated by pilots in direct communication with controllers. Giving specific information as to affected area, altitudes, intensity, and nature of severe weather can be of considerable value. When received by controllers, these reports will be relayed to other aircraft as appropriate.

Should avoidance of a weather situation enroute be desired, request a deviation from the route/altitude as far in advance as possible, including information as to the extent of deviation desired. An IFR clearance to circumnavigate severe weather can often be more readily obtained in the enroute areas away from terminals because there is usually less congestion and, therefore, greater freedom for course deviation. In terminal areas, the problem is more acute because of traffic density, ATC coordination requirements, complex departure and arrival routes, and adjacent airports. As a consequence, controllers are less likely to be able to accommodate all requests for weather detours in a terminal area or be in a

position to volunteer such routes. Nevertheless, do not hesitate to advise controllers of any observed significant weather or to ask to circumnavigate it.

Weather echoes observed on radar (airborne or ground) are a direct result of dense precipitation. All radar used for air traffic control purposes is not capable of equally displaying precipitation information. Under certain conditions in the past, the echoes received from precipitation have rendered ATC radar unusable. To avoid disruption to radar service, modifications designed to reduce precipitation clutter have been added to ATC radar systems. This feature, known as circular polarization, eliminates all but the heaviest areas of precipitation from the scope. So remember, all areas of precipitation will not appear on the controller's radar scope. Radar does not display turbulence. But it is known that turbulence is generally associated with areas of heavy precipitation, and controllers act accordingly.

Controllers will issue information about severe weather observed on radar when advisable and will, upon pilot request, provide vectors for avoidance whenever circumstances permit. For the above reasons, however, do not completely rely on air traffic controllers to provide this service at all times, particularly in terminal areas or in holding patterns. Also, remember that the controller's data are often far from complete because of design of the radar and its location relative to the weather observed.

In addition to primary surveillance radar, all Air Route Traffic Control Centers and many terminal radar facilities are also equipped with secondary radar systems (beacons). These secondary systems receive only those signals emitted by airborne radar beacon transponders and do not display weather echoes. Since all aircraft operating in positive control areas are required to be equipped with operating radar beacon transponders, controllers handling such traffic normally use only the secondary radar system. This permits filtering out nonpertinent traffic operating below positive control areas. Although controllers using only secondary radar will not see any weather on their scopes, they will, if alerted, often turn on the normal radar to observe weather, provided this does not result in weather clutter making the scope unusable for traffic control.

Recommended Pilot Actions

- All thunderstorms are potentially dangerous and should be avoided on a planned basis, if possible, or penetrated only when no other choice exists.
- Report to ATC any significant weather encountered giving nature, location, route, altitude, and intensity.
- Initiate requests to avoid severe weather activity as soon as possible, being specific concerning route and altitude desired.
- Adjust speed as necessary to maintain adequate control of aircraft in turbulent air and advise ATC of action taken as soon as possible.
- Do not rely completely on air traffic controllers to provide information or to initiate radar vectors to aircraft for avoidance of severe weather, particularly when arriving and departing terminals or in a holding pattern.
- Plan ahead to anticipate the need for avoiding areas of known severe weather. If necessary, delay takeoff or landing, as applicable.

Because of a mixed-up approach
and a near-miss,
everyone was too distracted to listen.
There was a . . .

COMMUNICATIONS GAP

By LT F. E. Jung and LTJG L. J. Fillmon

SHORTLY after launch at 1745, it became apparent to the *Intruder* "tanker" crew that a weak radio would be giving them problems. The crew had been briefed to give away 10,000 lbs to an A-3 tanker overhead at angels 20 and return in time to make an 1815 recovery.

The decision was made to continue the mission even though the radio's receiving range was less than 2 miles, and transmissions could only be heard within a half mile. The pilot stated, "I thought it would be a simple matter to join the A-3, but the loss of our radio prevented an expeditious rendezvous. By the time we found him and advised him of our problem, it was too late to make the recovery."

Departure control was advised of the situation and decided to send the two tankers to BARCAP. The tanking evolutions at BARCAP were normal, but on the return leg, the *Intruder* crew noted that they'd given away too much fuel.

As the BN relates, "We recalculated the fuel required for a 2000 recovery and noted that our fuel consumption was greater than usual. This was due to the fact that our trip to BARCAP had not been at our best conserve airspeed. We requested and received 1000 lbs from the *Skywarrior.*"

"At this time," the pilot comments, "we noted that our TACAN was intermittent. Darkness was closing in, and I began to notice a slight increase in pucker factor." The weather at the ship was 1000 broken, variable overcast, with multiple layers up to 15,000 feet. Two *Phantoms* were tanked by the A-3, and the 2000 approach time slipped by. It was now dark and moonless, and the penetration was commenced.

"As soon as we entered the clouds," the pilot remembers, "I developed a severe case of vertigo that stuck with me for the remainder of the flight. The lighting arrangement on the *Skywarrior* was less than acceptable. I was used to flying wing on A-6s, which look like Christmas trees at night, and it took all the concentration I could muster to remain with the A-3. Since we were approaching a bingo state of 3500 lbs, we informed the A-3 that this would be a bingo pass for us.

"To alleviate my vertigo, the BN was giving me a running commentary on altitudes, airspeeds, and attitudes. Except for vertigo, the approach to the ship appeared normal. At 1 mile, the BN looked out at the ship and this is what he saw:

"We were headed for the starboard side of the ship at least 30 degrees from the final bearing. My first thought was that we would be passing over another ship. At three-fourths of a mile, the A-3 broke off the approach, turned starboard, and passed abeam the starboard side of the ship (see Fig. 1). We were expecting to hear a bingo call from the ship because our fuel state was 3500 lbs.

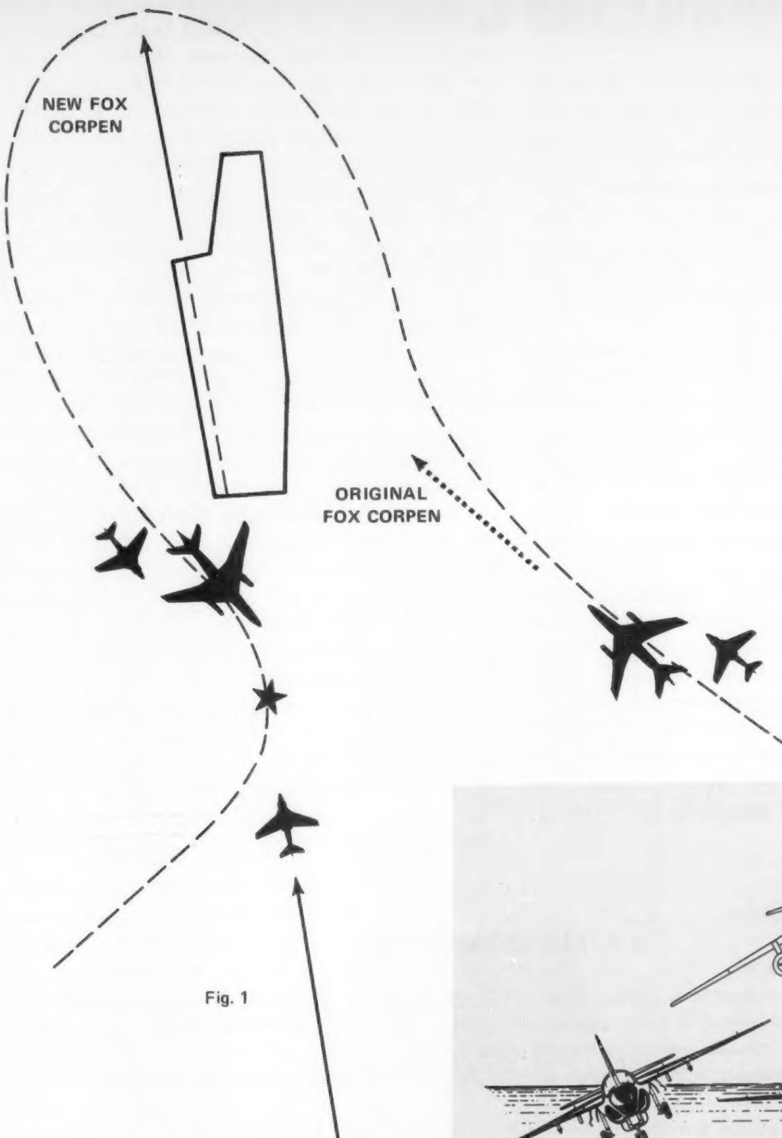


Fig. 1

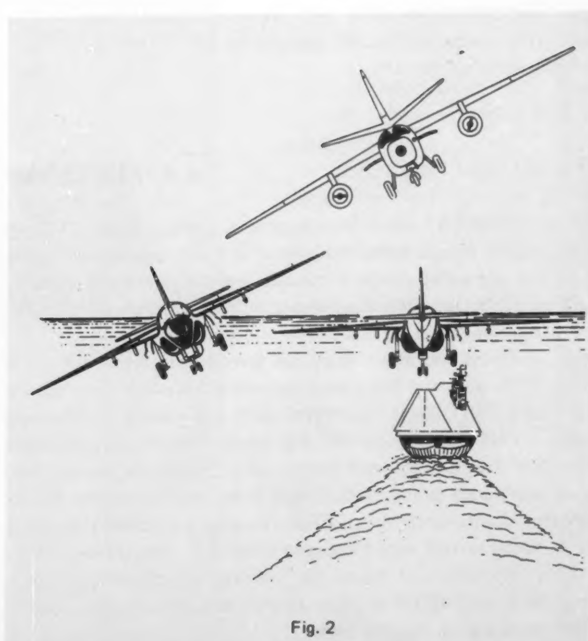


Fig. 2

The A-3 was given a downwind heading, so we stuck with him, since our radio was bad and our navaids unreliable.

"At about 800 feet," the BN continues, "abeam the ship on the downwind heading, I noted that the ship appeared to be out of position once again. We were actually flying across the final bearing! Approach control noted the error and gave us a starboard turn. I looked to the right and saw head-on traffic. Collision appeared imminent, and my first reaction was to yell at the pilot to break hard right. The lights of the other aircraft (another A-6) flashed across the windscreen." (See Fig. 1 and 2.)

In the words of the pilot, "There was an immediate thump when I saw the lights of the other aircraft flash by. I shudder to think of how close we must have come to each other. First, a bad CCA, and now, a near midair!

"On final, the A-3 didn't drop us off until one-eighth of a mile. I ended up trying to pick up the ball while at the same time flying formation on the A-3. When finally detached, we were so low that the LSO had no choice but to wave us off.

"Signal bingo was given with 2700 lbs remaining. Our attempt to rejoin the A-3 was hampered by the cloud cover. We lost sight of him many times, but finally joined up above 15,000 feet. He was unable to comply with our request to climb to 40,000 feet because he was experiencing pressurization problems. Since we couldn't use our bingo profile, we requested some additional fuel from the *Skywarrior*. Only 500 lbs were available, and after five attempts, I finally managed to get it. The fuel needle now read 1700 lbs.

"Weather at DaNang was similar to that at the ship. We could hear the A-3 talking with Approach and expected an immediate approach. (Wouldn't you know, we weren't the only ones around with problems.) Two other aircraft had declared emergencies. We made two orbits of the field and declared an emergency when our low-fuel light illuminated.

"After numerous vectors at low altitude, the runway finally came into view. The A-3 landed on the left runway, and we touched down on the right, with 700 lbs remaining. NATOPS recommends ejection at 500 lbs."

A lack of communication existed from the very beginning of this evolution. Luckily, everyone had a chance to learn from the experience without loss of life or property. The primary cause of the near midair was that the ship had turned to a new Fox Corpen and the CCA controller was unaware of the change. All heading information given the A-3 and A-6 on the first approach and downwind leg was based on the old Fox Corpen.

The vertigo experienced by the A-6 pilot was induced by flying night formation on an unfamiliar aircraft. Subsequently, section approaches by dissimilar aircraft within the air wing were discontinued under night, IFR conditions. Now, when such a section approach is required, it is policy to join up on an aircraft of the same type before commencing.

Additionally, whenever a decision to bingo is made, it should be adhered to. The A-6 crew took it for granted they would be bingoed after their first approach. They tried to communicate their desire to bingo through the A-3, but never got it across. Because of a mixed-up CCA and a near-miss, everyone was too distracted to listen.

Teamwork

STUDENT pilot, ENS Eugene L. Doty, USNR, VT-3, was practicing approaches at an outlying field. On his fourth approach, this one with full flaps, he rolled wings level on final and noted that he was slightly low. He added power to correct, and the engine started to cut out.

ENS Doty felt the aircraft shudder and, thinking he might have a landing gear problem, added a little more power in anticipation of a waveoff.

The power addition caused several loud bangs. On the runway, the RDO, CAPT John C. Beitz, USMC, VT-6, observed black smoke coming from the stacks. CAPT Beitz immediately came up on the radio and told ENS Doty to close his throttle and make a final landing.

ENS Doty responded and made a well-executed final landing one-third of the way down the runway. CAPT Beitz remained on the radio, closed the pattern, and directed two other solo students to depart. The crash crew requested that ENS Doty shut down after clearing the runway.

Maintenance investigation revealed the problem to be master rod bearing failure. The engine was highly contaminated with metal and most likely would have failed completely in another 30 seconds.

The Chief of Naval Air Training, commenting on the incident, stated: "The commendable teamwork between RDO and pilot, as well as professional airmanship, prevented an aircraft accident and possible personal injuries. Well done!"

notes from your flight surgeon

Keep Survivors Together

KEEPING together in the water is a basic of survival training. You should also keep survivors together when the rescuing helo lands on a busy flight deck, says an investigating flight surgeon.

When the four-man crew of a downed helo was recovered and returned to the carrier, attention was focused on the most seriously injured crewman to the virtual exclusion of the others. Meanwhile, the rescued pilot and copilot, unnoticed, left the helo through the port personnel door. Both men, who had been in the water without rafts for an hour and a half, were still suffering from a mild state of shock and confusion.

"A busy flight deck is no place to be walking unattended in such a condition," the flight surgeon says. "To avoid similar potentially dangerous occurrences in the future, I recommend that the rescue helicopter crew and medical department personnel on the flight deck cooperate to keep all survivors in one area, regardless of the severity of injury.

"In this way, the flight surgeon or medical officer in charge can evaluate the patients quickly and efficiently and have each one properly transferred to sickbay."

(Hey, Air Boss, why not augment the reception committee? – Ed.)

Surprise

"WE had just had a small squadron NATOPS review quiz, and less than 4 hours prior to the accident, I had reviewed takeoff emergencies," a pilot reported after ejection.

"I had thought previously about this type of situation and was surprised how fast I got things done."

(This comes as no surprise to those of us in the business of selling emergency training and survival know-how! – Ed.)

Well-Thought-Out Plan

"INASMUCH as there has never been a way to predetermine when and where an aircraft accident will occur, it is incumbent upon every naval aviator to be prepared for such an eventuality each time he straps himself into an aircraft. Without question, flying is an extremely demanding profession in which crewmember survival in an emergency situation may depend on 'minor' details.

"In my opinion, the survival of the pilot in this bailout was primarily due to a well-thought-out plan for an expedient egress in just such an emergency situation. If he had delayed even momentarily to disconnect his communications leads, it is doubtful that he could have survived the ground impact forces at a lower egress altitude with even less time for his parachute to stream."

Flight Surgeon in MOR

Common Sense

A RECENT fatal mishap indicates the possibility of an inflight oxygen mask fire. Elimination of supplemental oxygen mishaps can be accomplished by rigid adherence to the following common sense guidelines:

- Inspect and clean masks at specified intervals. Pilot should inspect his mask's condition prior to each flight.
- Wear the mask from engine start to shutdown.
- Secure the oxygen flow if the mask must be removed inflight for nose blow.
- Use only BUMED-approved lip balm.
- *No smoking in high-performance jet aircraft.* The desire for a butt while using oxygen may mean the loss of your own.

COMNAVAIRLANT *Weekly Safety Bulletin*

Time for a Change

CLOTHING soaked with JP-5 can cause chemical burns if you wear it too long.

In accordance with the 3-M program, a tank cleaning crew aboard a carrier was washing down an emptied jet fuel storage tank with salt water. Salt water and JP-5 residue soaked the clothing of one of the men. He didn't report this to his petty officer and continued work.

By the time he took his saturated clothing off 8 hours later, he had chemical burns. He's all right now. But for a while, as they used to say, "He ate his supper off the mantelpiece."

Whether you're a pilot, crewman, or plane pusher, if you get JP-5 on you, *clean up and change.*

Fighting For My Life...

"THE FIRST law in aircrew water survival is to get rid of your chute."

This is how the squadron survival officer sums up a carrier landing accident in which the pilot survived but the RIO did not. Both men entered the water in good condition after ejecting. Neither got rid of his parachute.

It all took place, on a dark, moonless night with no visible horizon.

The F-4J pilot's first approach to the ship after a routine mission was high. Waveoff. On his second pass, he landed hard, blew a tire, hook-skip No. 4 wire – bolter! The *Phantom* went off the angle at full power in a flat attitude, rotated, and began climbing.

At this point, the RIO, believing the aircraft was *in extremis*, initiated command ejection without warning the pilot.

The pilot was rescued with only minor injuries. The RIO drowned after entering the water in apparently reasonably good condition. His life preserver was inflated, and he had turned on his strobe light.

"This accident produced one of the most difficult survival situations in carrier aviation," the squadron survival officer says. "Almost instantaneously, the ejection took the crew from the relatively comfortable environment of their aircraft and put them in moderately heavy seas, on a dark night, in close proximity to the carrier."

Here's how the pilot recalls events:

"There was a 'whoosh' from the back seat and I was in the chute. The aircraft was above me – climbing in a 5- to 10-degree left bank and starting to nose over. The next thing I knew, I was in the water, and the bow of the boat was passing by rapidly about 30 feet away."

As seen from the bridge, the ejection occurred slightly forward of the ship's bow. At this point, nobody knew whether one or both crewmen had ejected; but from the direction of flight, it looked to those on the bridge as if at least one survivor was in the water almost dead ahead.

All maneuvers were conducted to displace the ship's keel and screws as far as possible from the survivors, the CO said later, but it was inevitable that the survivors would encounter the ship's wake. The initial order to the helm was to maneuver the bow to starboard away from the estimated position of the survivor/survivors. This was followed almost immediately by a shift of rudder to port to swing the stern clear.

"I ripped off my helmet and oxygen mask because they were hindering my breathing and vision. I was trying to inflate my LPA-1 when I saw the stern and lots of turbulence," the pilot continues. "I was being pulled down. It felt like being in a black washing machine. I was trying to pull my life preserver toggles and fighting for my life."

Before the pilot was pulled under the churning water, he managed to take one deep breath. After spinning and twirling, he found himself bobbing on the surface once again.

"At first, I didn't even know where I was or how I got there. I still don't know when I actually inflated my LPA – before or after the turbulence. Gradually, things began to come back to me."

An aside here from the squadron survival officer: "The pilot felt a great desire to rid himself of his oxygen mask. If worn properly, the mask functions underwater and provides emergency oxygen. At present, in my opinion, there is not enough training to demonstrate this underwater capability and give each aircrewman the chance to experience the sensation of breathing oxygen under pressure, under water."

The pilot pulled his seatpan, but could not find the liferaft lanyard. He then turned his strobe light on. His LPA-1 was snugly secured to his torso harness, but he had not properly adjusted the straps attaching the collar to the survival vest. He found that unless he held the collar down with his left hand, water would wash over his face. *(No mention is made of leg straps on the survival vest. – Ed.)* He held the strobe light up in his right hand. It took all his strength to cope with the life preserver collar and the strobe. (*The helmet he took off was not equipped with velcro for zapping the strobe light to it.*)

Although the SAR helo was within 100 feet of the pilot at one point, the crew didn't see him. He thought about using his radio or flares, but didn't want to release his hold on the life preserver collar or strobe light.

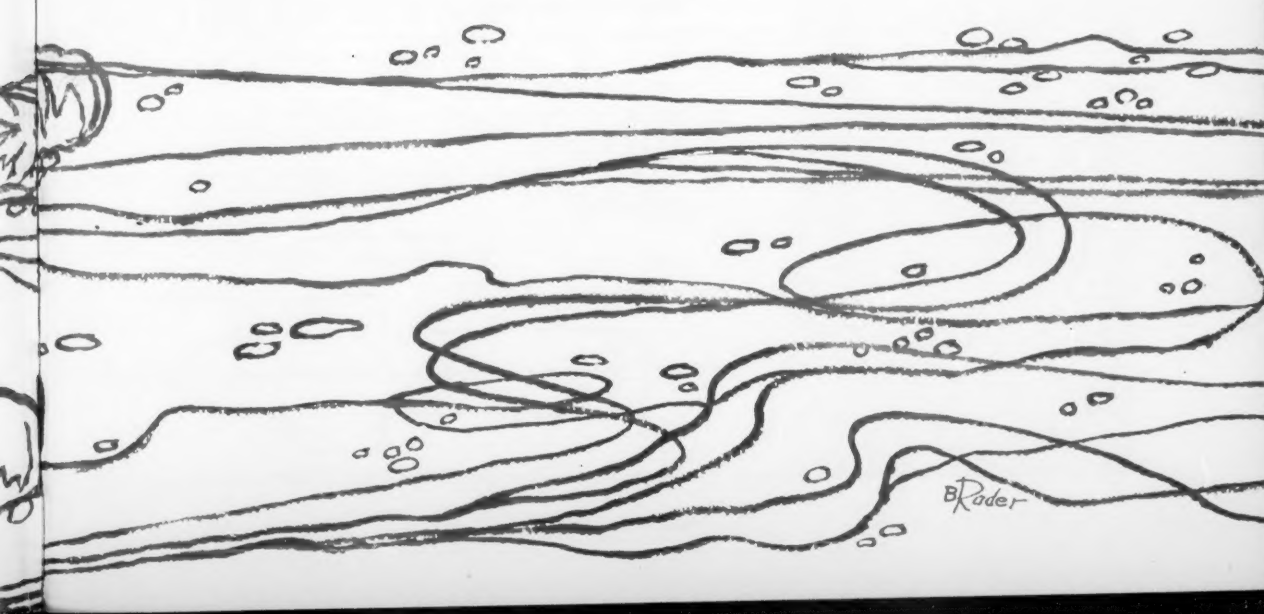
Shortly after the helo flew away, the pilot saw a light shining toward him and heard voices. A motor whaleboat was approaching.

As he was pulled aboard, for the first time he realized that he was still attached to all of his gear. He was still in his parachute with shroudlines wrapped around his left leg. His raft, now inflated, was secured to him by its lanyard, and his oxygen mask and helmet were hanging from the life preserver by the oxygen line.

"I believe the parachute dragging me down in the wake turbulence is what almost killed me and is what killed my RIO," he stated after it was all over.

His advice?

"The most important thing on entering the water is to get rid of your chute."



Letters

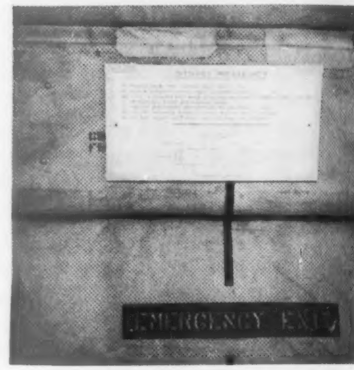
If you will establish a daily goal to do what you are trained to do, when you are supposed to do it, the way you are told to do it, safety has to be the result.

Major General T. H. Miller, USMC

Posted Helicopter Ditching Procedures

MARTD, NAS New Orleans – In an effort to maintain the highest standards in aviation safety, MARTD New Orleans (HMM-768) complied with the article "Helicopter Passenger Briefings" in the November 1972 issue of APPROACH and placed ditching placards (shown in the photo) throughout each detachment aircraft.

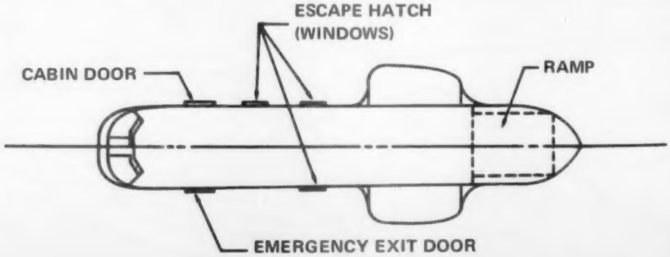
We believe that this permanent type installation is easily viewed by all passengers, is a necessary requirement for all transport helicopters, and eliminates difficult passenger briefings. We are pleased to notice the letter "Helo



Helo placard in aircraft.

DITCHING PROCEDURES

(1) REMAIN CALM – THE CREWMAN WILL ASSIST YOU.
(2) REMAIN STRAPPED IN UNTIL TOLD TO DEPART AIRCRAFT.
(3) MOVE TO NEAREST EXIT WHEN DIRECTED AND DEPART RAPIDLY. FOR LOCATIONS OF POSSIBLE EXITS SEE DIAGRAM BELOW. (VISUALIZE WHERE THE EXITS WOULD BE IF YOU WERE UPSIDE DOWN IN THE DARK. – ED.)
(4) FOLLOW DEPLOYMENT INSTRUCTIONS ON EMERGENCY EXITS.
(5) DO NOT EVACUATE AIRCRAFT UNTIL ROTORS HAVE STOPPED.
(6) DO NOT INFLATE LIFEVEST UNTIL OUTSIDE THE AIRCRAFT.



FLIP Changes

THE DEFENSE Mapping Agency, St. Louis, Missouri, has notified the Naval Safety Center of the following changes to FLIP documents:

- *ETA Entries in International Flight Plans.* Attention is invited to the note added to item 17 of the DD-1801 instructions in Section II N/S America. It explains, unlike the DD-175, that the ETA for Destination Aerodrome entered in item 17 includes the time required to land.
- *New FLIP Features.* The DOD terminated publication of the Special Southeast Asia Tactical VFR Chart series effective with the 1 Feb 1973 issue. The charts in the field are the last that will be produced.

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

Placard" in the March 1973 issue of APPROACH and find that other units are responding to the need for increased helicopter passenger safety.

We encourage all helicopter units to review helicopter passenger safety procedures and incorporate the use of these ditching procedures placards.

CAPT T. W. Holden, USMC
Aviation Safety Officer

• The ultimate compliment to a writer who cranks out aviation safety material every working day is for him to receive a letter like yours. Thanks. To think that someone read something you wrote and then did something about it is the finest kind of reward.

"Few Traditions Left"

Shearwater, N.S. – The rear cover of the February APPROACH is a new feature. The Navy has a few traditions. This is not one of them. Suggest it should remain so.

LT B. E. Rosedale, USN
VS-880 CAF Exchange Duty

• And we thought a pretty girl had always been an "attention getter" among sailormen. (See below.)

SRU-31/P Kit

FPO, San Francisco – In your January 1973 issue under "Notes From Your Flight Surgeon," the item titled "New Survival Kit" states that the SRU-31/P kits will go in the pockets of the SV-2A. That is true in some cases, but not always.

How about the fighter, attack, and trainer personnel whose kits go in with the raft equipment? Additionally, helicopter rescue crewmen don't carry the kits, and it is optional for personnel in multiengine, land-based, long-duration aircraft. Personnel in multiengine, carrier-based, short-duration aircraft don't carry any either. Read NAVAIR 13-1-6.7, page 2-2C and 2-3. This is the manual we are supposed to follow on all flight gear (but it is taken very lightly by some commands).

PRC Lester N. Lewis

• You caught us in an ambiguity. When we said "goes," we meant "fits," not *is carried*.

Although the SV-2A survival vest was originally designed to accommodate the *personal survival kits,* the survival equipment requirement charts in NAVAIR 13-1-6.7 permit carrying the SEEK-2/SRU-31/P in the *one man liferaft seat kit* in those cases in which the seatpan has enough room for them.

Amplification

University Park, Pa. – Hopefully, you'll receive many letters indicating some discomfort with the completeness of the statistical analysis in the "Sage of Doom" in the March issue. As a matter of fact, I find it rather comforting that the probability of a specific outcome remains the same for each independent event.

After 1000 accident-free flights, my chances of an accident on my next flight are the same, no worse than they were on flight number 10 or any other flight – assuming I'm a completely mechanical stick and rudder jockey. If I get complacent or overconfident, I can influence succeeding flights and swing the odds against me, or I can learn and improve my capability to handle potential problems and make each flight more likely to be accident-free than the preceding flight.

I realize this is exactly what the article is trying to say, but somehow it fails to drive a wooden stake through the heart of the old error. To the extent that I am able to improve and learn with each flight, statistics work for me, and my probability of an accident becomes less with each succeeding flight. That's it gents. Statistically, *I* can improve my probabilities for success. If *you* want to maintain the "statistics," *you* must have more accidents!

CAPT C. D. Bolan, USN
NROTC Penn State University

• Right on! Thanks for amplifying and clarifying the intent of the article. It's comforting to know that a "stick" of your experience is still hanging in there and reading APPROACH.

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Vol. 18 **approach** No. 12

RADM W. S. Nelson
Commander, Naval Safety Center
Publisher

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

Contents

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NavAir 00-75-510

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Credits

This month's cover painting by Craig Kavafes shows the EA-6B, *Prowler*, sweeping into action. Courtesy Grumman Aircraft Engineering Corp., Bethpage, L. I. Pg 4-5 Photos: PHAA Sara Brashee. Pg 16-17 Photos: PHAN McBride.

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Bravo Zulu

LCDR Earl H. Cushing, USN, VC-8

AS LCDR Cushing lowered the nosewheel of his EP-2H to the runway following a GCA and normal landing, a loud bang was heard accompanied by a bone-jarring vibration. The nosewheel piston assembly had fractured, causing loss of the nosewheel.

The first contact of the piston assembly stub occurred approximately 2400 feet down the runway, just past the first E-28 arresting gear cable. LCDR Cushing immediately rotated the nose of the aircraft off the deck and commenced aerodynamic braking.

He continued down the runway toward the second E-28 arresting gear, 5275 feet from the approach end. Before crossing the cable, LCDR Cushing eased the nose down until the stub again contacted the runway surface. He did this purposely to engage the "crossdeck pendant" with the nosegear stub.

The E-28 arresting cable was pulled out until it parted. About 600 feet farther down the runway, the E-5 chain arresting gear was engaged. The first of the two cables broke; the second held and brought the aircraft to a stop about 6800 feet down the runway.

Investigation revealed the loss of the nosewheel was due to a tension type failure precipitated by two cracks in the lower vertical wall of the nosewheel piston assembly cylinder just above the 90-degree angle, axle juncture.

The mishap board concluded that the mishap was an incident instead of an accident only because of the superb airmanship and professional ability of the pilot. During the landing rollout, LCDR Cushing wisely refrained from using either reverse pitch or brakes. His cool hand and clear thinking prevented further damage to the aircraft. Had he applied brakes or used reverse thrust, the outcome of this mishap might have been considerably different.

For the first recorded arrested landing of a P-2, COMNAVSAFECEN says, WELL DONE!

WANTED

Information Concerning:

Cloud Tops/Bases

Icing Conditions

Turbulence

TRW Buildups

PIREPS Help

(Help Your Fellow Pilots)

It only takes a minute and may Save a Life.

C 37